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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/876,977	06/08/2001	Lothar Wenzel	5150-56900	9949

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EXAMINER

CASCHERA, ANTONIO A

ART UNIT	PAPER NUMBER
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2676

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DATE MAILED: 07/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/876,977

Applicant(s)

WENZEL ET AL.

Examiner

Antonio A Caschera

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 12, 23, 24, 31, 34 and 35 is/are rejected.
- 7) ☐ Claim(s) 4-11, 13-22, 25-30, 32, 33 and 36-38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for domestic priority under 35 U.S.C. 119(e).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 12, 23, 24, 31, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davies et al. "Low-Discrepancy Sequences for Volume Properties in Solid Modeling." CSG'98. 1998 in view of Ninomiya et al. (U.S. Patent 5,790,442)..

In reference to claims 1, 23 and 34, Davies et al. discloses utilizing low discrepancy sequences for computing volume integrals in geometric modeling (see lines 1-2 of abstract, page 1). Davies et al. discloses implementing the Sobol and Niederreiter algorithms for computing low discrepancy sequences (see page 5, under "Point Sequences and Test Data Used"). Davies et al. discloses calculating the volume of an object by generating points which are then determined to lie within a rectangular box using equation nine on page 6 (see page 6, "Experimental Methodology" of Davies et al.). In reference to equation nine of page 6, Davies et al. further discloses V_{obj} to represent the volume of the object, V_{box} , the volume of the box,

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N_{in} the number of points within the object and *N* the total number of points generated (see page 7 of Davies et al.). Note, the office interprets determining whether points fall within the rectangular box of Davies et al. equivalent to the applying of boundary conditions of applicant's claims, the initial points generated of Davies et al. equivalent to the unbounded low discrepancy points of applicant's claims and the points determined to be within the box of Davies et al. equivalent to the bounded low discrepancy points of applicant's claims. Further note, the office interprets Davies et al. to inherently teach repeating the generation and applying of boundary conditions as all of the points generated by Davies et al. are tested to be within the rectangular box as the points within the box are computed as low discrepancy sequences to form the volume of the object (see page 6, "Experimental Methodology" and Figures 3-5 of page 7, test objects used in the experiment of Davies et al.). Davies et al. discloses generating the volume of the object (see page 6, "Experimental Methodology") which the office interprets as including low discrepancy sequences which can further be understood as the curvatures, located within the rectangular box, which makeup the object boundaries volume (see Figures 3-5 on page 7). Davies et al. does not explicitly disclose storing the low discrepancy sequence however Ninomiya et al. does. Ninomiya et al. discloses a method and system for generating a low discrepancy sequence whereby the sequence is stored in storage means (see lines 1-2 of abstract and column 10, lines 22-27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the low discrepancy point techniques of Davies et al. with the storing techniques of Ninomiya et al. in order to utilize the low discrepancy points/sequence at a later time to produce a desired computer generated output (see column 3, lines 25-48 of Ninomiya et al.). In reference to claims 23 and 34, Ninomiya et al. also discloses

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a CPU and a hard disk for performing arithmetic, logic and I/O operations and storing a computing program to implement the invention, respectively (see column 9, lines 38-40 and 44-46).

In reference to claim 2, Davies et al. and Ninomiya et al. disclose all of the claim limitations as applied to claim 1 above. Davies et al. discloses generating the volume of the object (see page 6, "Experimental Methodology") which the office interprets as including low discrepancy sequences which can further be understood as the curvatures, located within the rectangular box, which makeup the object boundaries volume (see Figures 3-5 on page 7).

In reference to claims 3, 24 and 35, Davies et al. and Ninomiya et al. disclose all of the claim limitations as applied to claims 1, 23 and 34 respectively above, in addition, Davies et al. discloses sampling parts of a space utilizing pseudo-randomness defined by low discrepancy sequences (see page 1, "Low-Discrepancy Sequences"). Note, the "sampling" of Davies et al. is seen functionally equivalent to the "scanning" of applicant's claims.

In reference to claims 12 and 31, Davies et al. and Ninomiya et al. disclose all of the claim limitations as applied to claims 1 and 23 respectively above. Ninomiya et al. discloses a method and system for generating a low discrepancy sequence whereby the sequence is stored in storage means (see lines 1-2 of abstract and column 10, lines 22-27). Note, since each sequence is stored each point making up the sequences must also inherently be stored.

Response to Arguments

3. Applicant's arguments, see page 12, filed 4/28/2004, with respect to the 35 U.S.C. § 112 rejection of claims 13, 14, 32 and 33, have been fully considered and are persuasive. Support for

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antecedent basis has been corrected for and therefore, the 35 U.S.C. § 112 rejection to claims 13, 14, 32 and 33 has been withdrawn.

4. Applicant's arguments filed 4/28/2204 have been fully considered but they are not persuasive.

In reference to claim 1, Applicant argues that neither the Davies nor the Ninomiya references teach generating a bounded low discrepancy point based on an unbounded low discrepancy point (see pages 13-14 of Applicant's Remarks). Even further, Applicant states, "...if Davies determines a low discrepancy point is outside the specified volume or region, the point remains in place, and no bounded point is produce..." (see page 14, 1st paragraph of Applicant's Remarks). The office disagrees as Davies specifically states on page 6, under "Experimental Methodology" that, "Each volume was calculated by generating points lying inside a rectangular box enclosing the object." Clearly such a point is a bounded point which is generated and can read on the claim language of claim 1. Therefore, the office maintains its previous rejection as applied to claim 1.

In reference to claim 2, Applicant argues that, "...Davies' object boundaries are not a sequence of bonded low discrepancy points as disclosed and claimed in the present invention," (see page 15, 1st paragraph of Applicant's Remarks). The office disagrees as Davies specifically discloses figures of volumes including curvatures located within a rectangular box making up the object boundaries volume (see Figures 3-5 on page 7), such curvatures can be interpreted as low discrepancy sequences and can read on the language of claim 2. Therefore, the office maintains its previous rejection as applied to claim 2.

Allowable Subject Matter

5. Claims 4-11, 13-22, 25-30, 32, 33 and 36-38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In reference to claims 4, 15, 26 and 37, the prior art of record (Nair et al. (U.S. Patent 6,219,452 B1), Wenzel et al. (U.S. Patent 6,222,940 B1), Herken et al. (U.S. Patent 6,529,193 B1), Ninomiya et al. (U.S. Patent 5,790,442), Wenzel et al. (EP 1018708A2), Davies et al. "Low-Discrepancy Sequences for Volume Properties in Solid Modeling," and Dobkin et al. "Computing The Discrepancy With Applications To Supersampling Patterns.") does not explicitly disclose selecting two or more irrational numbers, a step size epsilon and incrementing one or more terms of the current position based on a factor of epsilon and the irrational numbers in combination with the further limitations of claims 4, 15, 26 and 37.

In reference to claims 5-10, 13, 14, 16-19, 27-30, 32, 33 and 38, claims 5-10, 13, 14, 16-19, 27-30, 32, 33 and 38 are dependent upon claims 4, 15, 26 and 37 respectively and therefore are also objected to.

In reference to claims 11, 25 and 36, the prior art of record (Nair et al. (U.S. Patent 6,219,452 B1), Wenzel et al. (U.S. Patent 6,222,940 B1), Herken et al. (U.S. Patent 6,529,193 B1), Ninomiya et al. (U.S. Patent 5,790,442), Wenzel et al. (EP 1018708A2), Davies et al. "Low-Discrepancy Sequences for Volume Properties in Solid Modeling," and Dobkin et al. "Computing The Discrepancy With Applications To Supersampling Patterns.") does not explicitly disclose applying one of a reflecting boundary condition or a toroidal boundary

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condition at each border of the region if the unbounded Low Discrepancy Point is outside of the region.

In reference to claims 20 and 22, the prior art of record (Nair et al. (U.S. Patent 6,219,452 B1), Wenzel et al. (U.S. Patent 6,222,940 B1), Herken et al. (U.S. Patent 6,529,193 B1), Ninomiya et al. (U.S. Patent 5,790,442), Wenzel et al. (EP 1018708A2), Davies et al. "Low-Discrepancy Sequences for Volume Properties in Solid Modeling," and Dobkin et al. "Computing The Discrepancy With Applications To Supersampling Patterns.") does not explicitly disclose generating a curve in a region applying boundary conditions to one or more terms of an unbounded Low Discrepancy Point in response to incrementing to generate a bounded Low Discrepancy Point wherein the bounded Low Discrepancy Point is located within the region, in combination with the further limitations of claims 20 and 22.

In reference to claim 21, claim 21 is dependent upon claim 20 and therefore is objected to.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Antonio Caschera whose telephone number is (703) 305-1391. The examiner can normally be reached Monday-Thursday and alternate Fridays between 7:00 AM and 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella, can be reached at (703)-308-6829.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive,
Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

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aac

6/24/04

A handwritten signature in black ink, appearing to read 'Kee M. Tung', with a long, sweeping horizontal stroke extending to the right.

Kee M. Tung
Primary Examiner